

C L A I M S

1. A UWB short-range radar characterized by comprising:

5 a transmitting unit which emits a short pulse wave which satisfies a predetermined spectrum mask from an antenna into space;

a receiving unit which receives a reflected wave produced by an object existing in space of the short pulse wave emitted by the transmitting unit; and

10 a signal processing unit which performs an analyzing process for the object based on an output signal from the receiving unit,

wherein

the transmitting unit has:

15 a pulse generator which outputs pulse signals each having a predetermined width at a predetermined frequency; and

a burst oscillator which receives the pulse signal output from the pulse generator and performs an
20 oscillation operation for a time corresponding to the width of the pulse signal to output a short pulse signal serving as the short pulse wave, and

a width and a cycle of the pulse signal output from the pulse generator and an oscillation frequency
25 of the short pulse signal output from the burst oscillator are set such that almost an entire main lobe of a spectrum of the short pulse wave emitted from the

antenna into space falls within a range of 24.0 to 29.0 GHz in the predetermined spectrum mask, and that a radiation power density to an RR radiowave emission prohibited band held by the predetermined spectrum mask is lower than a peak radiation power density of the main lobe by not less than 20 dB.

2. The UWB short-range radar according to claim 1, characterized in that

both ends of the main lobe of the spectrum of the short pulse wave output from the burst oscillator fall within a range of 24.0 to 29.0 GHz in the predetermined spectrum mask.

3. The UWB short-range radar according to claim 1, characterized in that

a side lobe on a low-frequency side of the main lobe of the spectrum of the short pulse wave output from the burst oscillator overlaps the RR radiowave emission prohibited band held by the predetermined spectrum mask.

4. The UWB short-range radar according to claim 1, characterized in that

the burst oscillator is constituted by:

an oscillation unit comprising a signal inverter and a feedback circuit which delays an output signal from the signal inverter to feed back to an input terminal, the oscillation unit performing oscillation at a frequency determined by input/output response time

of the signal inverter and delay time of the feedback circuit; and

5 a switch circuit which sets the oscillation unit in an oscillation state only in a period in which the pulse signal output from the pulse generator is received.

5. The UWB short-range radar according to claim 2, characterized in that

the burst oscillator is constituted by:
10 an oscillation unit comprising a signal inverter and a feedback circuit which delays an output signal from the signal inverter to feed back to an input terminal, the oscillation unit performing oscillation at a frequency determined by input/output response time
15 of the signal inverter and delay time of the feedback circuit; and

a switch circuit which sets the oscillation unit in an oscillation state only in a period in which the pulse signal output from the pulse generator is
20 received.

6. The UWB short-range radar according to claim 3, characterized in that

the burst oscillator is constituted by:
an oscillation unit comprising a signal inverter
25 and a feedback circuit which delays an output signal from the signal inverter to feed back to an input terminal, the oscillation unit performing oscillation

at a frequency determined by input/output response time of the signal inverter and delay time of the feedback circuit; and

5 a switch circuit which sets the oscillation unit in an oscillation state only in a period in which the pulse signal output from the pulse generator is received.

7. The UWB short-range radar according to claim 1, characterized in that

10 the burst oscillator is constituted by:

an oscillation unit comprising an amplifier, a resonator connected to an input unit or an output unit of the amplifier, and a feedback circuit which performs positive feedback from an output side of the amplifier to an input side of the amplifier, the oscillation unit performing oscillation at a frequency determined by the resonator; and

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a switch circuit which sets the oscillation unit in an oscillation state only in a period in which the pulse signal output from the pulse generator is received.

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8. The UWB short-range radar according to claim 2, characterized in that

the burst oscillator is constituted by:

25 an oscillation unit comprising an amplifier, a resonator connected to an input unit or an output unit of the amplifier, and a feedback circuit which performs

positive feedback from an output side of the amplifier to an input side of the amplifier, the oscillation unit performing oscillation at a frequency determined by the resonator; and

5 a switch circuit which sets the oscillation unit in an oscillation state only in a period in which the pulse signal output from the pulse generator is received.

9. The UWB short-range radar according to
10 claim 3, characterized in that

the burst oscillator is constituted by:

an oscillation unit comprising an amplifier, a resonator connected to an input unit or an output unit of the amplifier, and a feedback circuit which performs
15 positive feedback from an output side of the amplifier to an input side of the amplifier, the oscillation unit performing oscillation at a frequency determined by the resonator; and

a switch circuit which sets the oscillation unit
20 in an oscillation state only in a period in which the pulse signal output from the pulse generator is received.

10. The UWB short-range radar according to
claim 1, characterized in that

25 the transmitting unit is provided with a filter which suppresses a component having a frequency ranging from 23.6 to 24.0 GHz of a frequency component included

in the short pulse wave output from the burst oscillator.

11. The UWB short-range radar according to claim 2, characterized in that

5 the transmitting unit is provided with a filter which suppresses a component having a frequency ranging from 23.6 to 24.0 GHz of a frequency component included in the short pulse wave output from the burst oscillator.

10 12. The UWB short-range radar according to claim 3, characterized in that

 the transmitting unit is provided with a filter which suppresses a component having a frequency ranging from 23.6 to 24.0 GHz of a frequency component included
15 in the short pulse wave output from the burst oscillator.

13. The UWB short-range radar according to claim 4, characterized in that

 the transmitting unit is provided with a filter
20 which suppresses a component having a frequency ranging from 23.6 to 24.0 GHz of a frequency component included in the short pulse wave output from the burst oscillator.

25 14. The UWB short-range radar according to claim 7, characterized in that

 the transmitting unit is provided with a filter which suppresses a component having a frequency ranging

from 23.6 to 24.0 GHz of a frequency component included in the short pulse wave output from the burst oscillator.

15 15. The UWB short-range radar according to claim 1, characterized in that

10 the antenna of the transmitting unit has a structure obtained by surrounding an antenna element with a cavity, and a resonant frequency of the cavity is caused to fall within a range of 23.6 to 24.0 GHz to reduce gain in the band.

16. The UWB short-range radar according to claim 2, characterized in that

15 the antenna of the transmitting unit has a structure obtained by surrounding an antenna element with a cavity, and a resonant frequency of the cavity is caused to fall within a range of 23.6 to 24.0 GHz to reduce gain in the band.

17. The UWB short-range radar according to claim 3, characterized in that

20 the antenna of the transmitting unit has a structure obtained by surrounding an antenna element with a cavity, and a resonant frequency of the cavity is caused to fall within a range of 23.6 to 24.0 GHz to reduce gain in the band.

25 18. The UWB short-range radar according to claim 4, characterized in that

the antenna of the transmitting unit has a

structure obtained by surrounding an antenna element with a cavity, and a resonant frequency of the cavity is caused to fall within a range of 23.6 to 24.0 GHz to reduce gain in the band.

5 19. The UWB short-range radar according to claim 7, characterized in that

the antenna of the transmitting unit has a structure obtained by surrounding an antenna element with a cavity, and a resonant frequency of the cavity
10 is caused to fall within a range of 23.6 to 24.0 GHz to reduce gain in the band.

20. The UWB short-range radar according to claim 10, characterized in that

the antenna of the transmitting unit has a
15 structure obtained by surrounding an antenna element with a cavity, and a resonant frequency of the cavity is caused to fall within a range of 23.6 to 24.0 GHz to reduce gain in the band.